HW 24 #4:

Answers: 653 nm, 102 nm, 122 nm

$E = 12.3\ eV$ → max. energy of electrons, so we can use allowed energies below this

$$E = \frac{hc}{\lambda}$$

$$\lambda = \frac{hc}{E}$$

$$E_1 = -13.6\ eV$$

$$E_2 = \frac{-13.6\ eV}{2^2} = -3.4\ eV$$

$$E_3 = \frac{-13.6\ eV}{3^2} = -1.51\ eV$$

$$E_4 = \frac{-13.6\ eV}{4^2} = -0.85\ eV$$

✓ $E_2 - E_1 = 10.2\ eV$

✓ $E_3 - E_1 = 12.08\ eV$

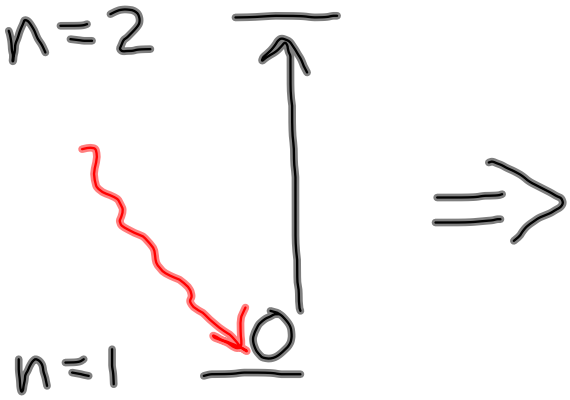
✗ $E_4 - E_1 = 12.75\ eV$

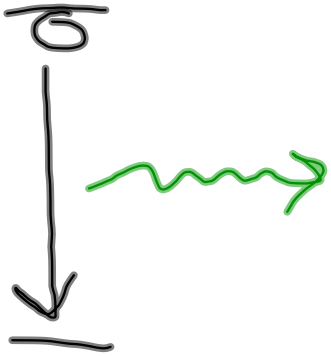
✓ $E_3 - E_2 = 1.8\ eV$

$$\lambda_{2\to1} = \frac{hc}{\Delta E_{2\to1}} = 122\ nm$$

$$\lambda_{3\to1} = \frac{hc}{\Delta E_{3\to1}} = 102\ nm$$

$$\lambda_{3\to2} = \frac{hc}{\Delta E_{3\to2}} = 653\ nm$$





Gain energy to move e^- up

Lose energy to move e^- down